Chapter 19 INSULATION

MANUFACTURER/DISTRIBUTOR:

CrossRoads C&I Inc.
c/o Liette Larose
5760 Côte de Liesse
Ville Mont-Royal, Quebec H4T 1B1
Phone: 514-738-1916 Ext.2706
Fax: (514) 738-2058
800-738-2058
llarose@glasscellisofab.com

19.1 **PLUMBING INSULATION**

19.2 **VENTILATION INSULATION**

Foamglas

Used on the 3" intake pipe inside the building

FOAMGLAS®

SHOP DRAWING
Reviewed by: Samuel Charbonneau
Date: 21 juin 2016
Reviewed [X]
Reviewed as noted [ ]
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Out for approval
SIFEC NORTH INC.

Pittsburgh Corning

Protecting Companies and Their People Worldwide

INDUSTRIAL PIPING, DUCTS AND EQUIPMENT

FOAMGLAS® insulation is a lightweight, rigid material composed of millions of completely sealed glass cells. Each cell is an insulating entity. FOAMGLAS® insulation's all-glass, closed-cell structure provides the following benefits:

- Constant Insulating Efficiency
- Zero Water Vapor Permeability
- Moisture Resistance
- Fire Protection
- Corrosion Resistance
- Long-Term Dimensional Stability
- Vermin Resistance
- CFC and HCFC Free

These benefits result in FOAMGLAS® Insulation Systems that are long-lasting, require little maintenance and are ideal for:

- Low temperature pipe, equipment, tanks and vessels
- Medium and high temperature pipes and equipment
- Hot oil and hot asphalt storage tanks
- Heat transfer fluid systems
- Hydrocarbon processing systems
- Chemical processing systems
- Above ground and underground steam and chilled water piping
- Commercial piping and ductwork

Manufactured to comply with ASTM C552-07.

FOAMGLAS® insulation is manufactured by Pittsburgh Corning in a basic block form. Blocks are fabricated into a wide range of shapes, thicknesses and sizes to satisfy industrial insulation requirements.

PHYSICAL AND THERMAL PROPERTIES OF FOAMGLAS® ONE™ INSULATION

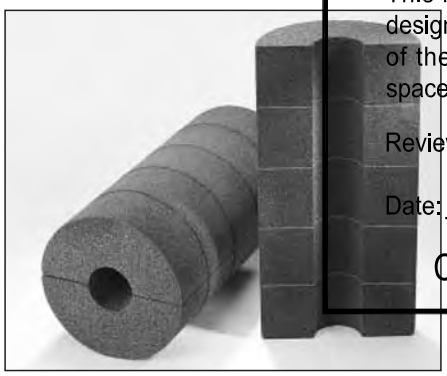
PHYSICAL PROPERTIES	SI	ENGLISH	ASTM STANDARD	EUROPEAN STANDARD
Absorption of Moisture (% by Volume)	0.2%	0.2%	C 240	EN 1609
	Only moisture retained is that adhering to surface cells after immersion			
Water-Vapor Permeability	0.00 perm-cm	0.00 perm-cm	E96 Wet Cup, Procedure B	EN ISO 10456
Acid Resistance	Impervious to common acids and their fumes except hydrofluoric acid			
Capillarity	None	None		EN 1609
Combustibility	Noncombustible, will not burn.		E 136	EN ISO 1182 (Class A1)
Composition	Soda-lime silicate glass — inorganic with no fibers or binders.			
Compressive Strength Average for Standard Material (+/-10%)	600 kPA	90 psi	C 165 C 240 C 552	EN 826
	Strength for flat surfaces capped with hot asphalt. For curved surfaces and pipe supports, contact PCC.			
Density, Average	120 kg/m^3	7.5 lb/ft^3	C 303	
Dimensional Stability	Excellent — does not shrink, swell or warp.			EN 1604
Flexural Strength, Block Average	480 kPa	70 psi	C 203 C 240	
Hygroscopicity	No increase in weight at 90% relative humidity.			EN 12089
Linear Coefficient of Thermal Expansion 25°C to 300°C (75°F to 575°F)	9.0 x 10^{-6}/°K	5.0 x 10^{-6}/°F	E 228	EN 13571
Maximum Service Temperature	480°C	+900°F		EN 14706
Modulus of Elasticity, Approx.	900 MPa	1.3 x 10^5 psi	C 623	
Thermal Conductivity	W/mK 0.039 @ 0°C 0.040 @ 10°C	Btu-in/hr•ft^2•°F 0.29 @ 75 °F 0.28 @ 50 °F	C 177 C 518	EN 12667 EN 12939
Specific Heat	0.84 kJ/kg•°K	0.20 Btu/lb•°F		
Thermal Diffusivity	4.2 x 10-7m^2/sec	0.016 ft^2/hr		

Notes: Measurements were collected using ASTM guidelines and, unless otherwise specified, properties were collected at 24°C (75°F). Properties may vary with temperature. The measurements listed in the table are average or typical values recommended for design purposes, and are not intended as specification or limit values.

Foamglas

FOAMGLAS® ONE™ INSULATION SYSTEMS FOR INDUSTRIAL APPLICATIONS

Pittsburgh Corning has developed insulation systems for a wide range of piping and equipment applications—above ground or underground, indoors or outdoors—at operating temperatures from -450°F to +900°F (-268°C to +482°C).



With the patented StrataFab® System, blocks of FOAMGLAS® insulation are laminated into billets using a special high temperature adhesive. These billets are fabricated into the desired shapes and sizes for pipe, tank, vessels, flanges and valves—practically any industrial insulation application.

SHOP DRAWING

This review is solely for the verification of general design quality and does not alleviate the responsibility of the contractor for insuring that all specification, space and installation requirements are met.

Reviewed By: M.M.

Date: 24 June 2016

Reviewed ☒
Reviewed as noted ☐
Resubmit ☐

CHIARELLI ENGINEERING LTD.

Totally Impermeable

Long Term Performance
Because it consists of closed glass cells, FOAMGLAS® insulation resists moisture in both liquid and vapor forms. When tested in accordance with ASTM E96, it has a permeability rating of 0.00 perm-in.

Noncombustible
FOAMGLAS® insulation is 100% glass and contains no binders or fillers—it cannot burn. FOAMGLAS® insulation will not absorb flammable liquids or vapors. If a fire does occur, FOAMGLAS® insulation will help contain it.

Corrosion-Resistant
All-glass FOAMGLAS® insulation is unaffected by common chemicals and by most corrosive plant atmospheres. It does not promote metal corrosion and its moisture resistance will help keep water from reaching equipment and piping.

Dimensionally Stable
FOAMGLAS® insulation is unaffected by temperature differentials and humidity. It will not swell, warp, shrink or otherwise distort. The insulation system's integrity remains intact.

High Compressive Strength
FOAMGLAS® insulation can withstand loads which crush most other insulating materials. In a properly designed piping system, FOAMGLAS® insulation eliminates the need for special treatment at pipe cradles. It also provides a firm base for roof membranes, jacketing or vapor retarders, prolonging their life.

Technical Service
Pittsburgh Corning's Technical Service Staff provides product, application and materials testing—standardized and customized specifications—on-site customer assistance and installation guidance.

For complete data on FOAMGLAS® Insulation Systems, please visit our Web site at www.foamglas.com, or contact Pittsburgh Corning at any of the following locations:

Pittsburgh Corning USA
(Corporate Headquarters)
800 Presque Isle Drive
Pittsburgh, PA 15239
Tel: 1-724-327-6100
Fax: 1-724-387-3807

Pittsburgh Corning Corporation Asia
(Asia Headquarters)
Pittsburgh Corning Corporation
3-7-4-304 Hikarigaoka
Nerima-ku, Tokyo, Japan 179-0072
Tel & Fax: 011 81-3-5997-0248

Pittsburgh Corning Europe NV
(Europe / Middle East Africa
Headquarters)
Albertkade, 1
B-3980 Tessenderlo
Belgium
Tel: +32-13-66-17-21
Fax: +32-13-66-78-54

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www.GreenSpec.com

ISO 9001:2000
KEMA CERTIFICATE
Accredited by ANSI-RAB NAP
Accredited by the Dutch Council for Accreditation (RvA)

BCCA ISO 9001:2000

STANDARDS, CERTIFICATIONS* AND APPROVALS

FOAMGLAS® insulation can be certified to conform to the requirements of:

- ASTM C 552 "Specification for Cellular Glass Thermal Insulation"
- Military Specification MIL-I-24244C, "Insulation Materials, Thermal, with Special Corrosion and Chloride Requirement"
- Nuclear Regulatory Guide 1.36, ASTM C 795, C 692, C 871
- Flame Spread 5, Smoke Developed 0 (UL 723, ASTM E 84), R2844; also classified by UL of Canada, CR1957
- ISO 9001:2000
- UL 1709
- For a listing of UL Through Penetration Fire Stop Approved Systems please search the UL Database at http://www.ul.com/ Once on this page click on CERTIFICATIONS on the left hand side. Under General Search click on UL FILE NUMBER and type in R15207 and then SEARCH
- Board of Steamship Inspection (Canada) Certificate of Approval No. 100/F1-98
- General Services Administration,PBS (PCD): 15250, Public Building Service Guide Specification, "Thermal Insulation (Mechanical)"
- New York City Dept. of Bldgs., MEA #138-81-M FOAMGLAS® insulation for piping, equipment, walls and ceilings
- New York State Uniform Fire Prevention and Building Code Dept. of State (DOS) 07200-890201-2013
- City of Los Angeles General Approval RR22534

FOAMGLAS insulation is identified by Federal Supply Code for Manufacturers (FSCM 08869)

***Written request for certificate of compliance must accompany order.**

FOAMGLAS®

Printed in U.S.A.

FG-3 Rev. 1/09 (Replaces Rev. 11/05)

Used on the 3" intake pipe inside the building

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Reviewed by: Samuel Charbonneau
Date: 21 juin 2016
Reviewed [X]
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SIFEC NORTH INC.

GCI
GLASSCELL ISOFAB INC.

TECHNICAL DAT

FABRICATED METAL PRODUCTS

ALUMACLAD ROLLS AND CUT AND ROLLED

DESCRIPTION	GCI's Alumaclad Roll Jacketing is manufactured from Series 3000 alloys to meet the requirements of ASTM B-209. The BLUE coated interior offers moisture protection while the acrylic exterior finish offers better resistance in corrosive environments than a mill finish type. This combination has provided excellent protection for over 25 years. Rolled Jacketing is supplied in rolls that allow the installer to cut desired lengths to suit a particular application. Standard rolls are supplied in either 36" or 48" (918 mm or 1218 mm) widths and are available with or without a factory applied moisture barrier. The rolls are supplied in cardboard cartons for easy identification and storage. To increase job site efficiency, jackets are also offered pre-cut and rolled to fit standard insulated pipes.
AVAILABLE TYPES	Aluminum (Alumaclad) rolled jacketing and cut and rolled jacketing are pre-painted and available in smooth (SM), stucco embossed (SE) or cross crimped (CC. Thicknesses range from .006" to .050" in aluminum. Standard rolll lengths are 100 ft. in aluminum. These rolls are available with a clear epoxy coating for corrosion protectionand with or without factory applied moisture barrier. Moisture barriers are available as Polykraft, Painted acrylic “Blue Barrier” or Polysurlyn film. * Non standard roll lengths are available upon request.
ADVANTAGES	Rolled Jacketing in standard length rolls allows the installer the convenience of cutting desired length pieces as required in the field. Rolls may be inventoried for convenience and quick response times. They may be used to cover insulated piping, tanks and other mechanical equipment. Cut and rolled jackets are pre-cut to length and are economical to use on most job sites as the premium paid for the service is significantly less than the labor involved in cutting the jacket on site and the additional handling of large rolls.
APPLICATIONS	Rolled Jacketing may be fastened with either bands, screws or pop rivets depending on the application. Rolled Jacketing looks good and provides a neat finish to any insulated system. All laps should be arranged to shed water and edges caulked with an approved sealant where required.

0.16

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Reviewed By: M.M.
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GCI
GLASSCELL ISOFAB INC.

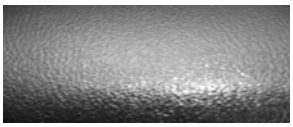
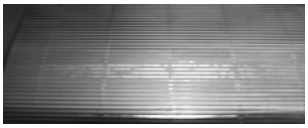
TECHNICAL DATA

FABRICATED METAL PRODUCTS

FABRICATED METALS ROLLS AND CUT AND ROLLED - 2

WIDTHS :	LENGTHS :
36" Standard, 48" on Special order.	100' Standard or Cut & Rolled to Length.

THICKNESSES:	USAGE:
.016”	Use in areas subject to traffic and abuse. Use on insulated lines up to 36” O.D.
.020”	Use on larger lines and large equipment up to 8’ in diameter.
.024”	Use in applications where extra thickness and protection is required.
.032”	Use where severe mechanical abuse or special fabricating requirements such as flat ducts or precipitators. Also in very windy areas.
.040” (Special Order)	

FINISHES:	PLAIN	PEBBLED (STUCCO)	CORRUGATED 3/16”:
			
	Use where minimum abuse is expected.	Use where some abuse is expected.	Use where maximum abuse is expected.

FEATURES	BENEFITS
Recycled content	Produced from 99% scrap. 80% of the scrap is from post-consumer sources.
Excellent emittance	Contributes to lower heat losses and personnel protection.
Coated Moisture Barrier	Eliminates possibility of delaminating in Lock formers. Coverage is full roll width.
Fire Protection	Coatings contribute less to a fire than Kraft or poly films.
Tensile & yield	Conforms to Aluminum Association standards for tensile & yield properties for each temper.
Bending	Meets Aluminum Association specifications for bending.

DUCT insulation

sustainable insulation

Specification Sheet

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SIFEC NORTH INC.

CertainTeed
SAINT-GOBAIN

SoftTouch™ Duct Wrap Insulation

Product Name	CertainTeed SoftTouch™ Duct Wrap Insulation
Manufacturer	CertainTeed Corporation
Address	P.O. Box 860 Valley Forge, PA 19482-0105
Phone	610-341-7000 • 800-233-8990
Fax	610-341-7571
Website	www.certainteed.com/insulation

PRODUCT DESCRIPTION

Basic Use: SoftTouch™ Duct Wrap Insulation is used to insulate rectangular and round heating, ventilating and air conditioning ductwork.

Benefits: SoftTouch Duct Wrap Insulation provides thermal efficiency that reduces unwanted heat loss or gain from equipment and ductwork. When properly installed in the correct thickness, this product virtually eliminates condensation problems on cold duct surfaces.

Composition and Materials: SoftTouch Duct Wrap is a blanket-type insulation composed of tan, uniformly textured, inorganic fibrous glass formed with a formaldehyde-free plant-based binding agent. It is available unfaced or with FSK, gray PSK or white PSK vapor retarder facing. On faced products, a stapling/taping tab is provided on one edge.

Limitations: The product should be kept clean and dry from the time of manufacture through job site installation and system operation.

SoftTouch Duct Wrap is suitable for use with most heating, ventilating and air conditioning ductwork operating at temperatures from 35°F to 250°F (1.7°C to 121°C) for faced SoftTouch Duct Wrap, and from 35°F to 450°F (1.7°C to 232°C) for unfaced SoftTouch Duct Wrap.

Sizes: See table on back for available sizes. Contact CertainTeed for other sizes and minimum order quantities.

INSTALLATION

Sheet metal ducts must be clean, dry and sealed tightly prior to insulating with CertainTeed SoftTouch Duct Wrap.

To ensure installed thermal performance, CertainTeed SoftTouch Duct Wrap must be cut to "stretch-out" dimensions. This requires measurement of the duct perimeter, then cutting the duct wrap to the dimensions (perimeter + add-on) indicated in the stretch-out table on the other side. A 2" piece of insulation is removed from the facing at the end of the piece of insulation to form an overlapping stapling and taping flap.

CertainTeed SoftTouch Duct Wrap is installed by wrapping the insulation around the perimeter of the duct with the facing out. Adjacent sections of duct wrap are tightly butted with the 2" taping flap overlapping. Seams must be stapled with outward-clinching staples on approximately 6" centers. When a vapor retarder is required, all seams, joints, tears, punctures and/or other penetrations of the duct wrap must be sealed with a pressure sensitive vapor retarder tape that matches the facing, or a suitable mastic system.

Where rectangular ducts are 24" in width or greater, CertainTeed SoftTouch Duct Wrap must be additionally secured to the bottom of the duct with mechanical fasteners spaced 18" on center to prevent sagging.

For additional installation details, consult the National Commercial and Industrial Insulation Standards (current edition) published by the Midwest Insulation Contractors Association (MICA).

AVAILABILITY AND COST

Manufactured in U.S.A. Available in select Western U.S./Canada regions. For availability and cost contact your local distributor, or call CertainTeed Sales Support Group in Valley Forge, PA at 800-233-8990.

WARRANTY

Refer to CertainTeed's Limited One-Year Warranty for Fiber Glass Duct Wraps (30-29-047).

MAINTENANCE

An inspection and preventative maintenance program for the HVAC system is recommended to ensure optimum performance.

TECHNICAL DATA

Applicable Standards

- Model Building Codes:
  – ICC
- Material Standards:
  – ASTM C1290
    Type I, Unfaced
    Type II, PSK – Grey
    Type III, FSK & PSK – White
  – ASTM C553
    Type I, Type 75 Duct Wrap
    Type II, Type 100 & 150 Duct Wrap
    Type III, Type 150 Duct Wrap
  – CAN/CGSB-51.11-92
  – ASTM C1136: FSK & White PSK, Type II, Gray PSK, Type IV
- Fire Safety Standards:
  – NFPA 90A, NFPA 90B

Fire Resistance

- Fire Hazard Classification:
  – UL 723, ASTM E84, CAN/ULC-S102
    Max. Flame Spread Index: 25
    Max. Smoke Developed Index: 50
- Non-Combustible: ASTM E136 / Meets test requirements

Physical/Chemical Properties

- Thermal Performance: See table on other side
- Operating Limits:
  – Temperature: ASTM C411
    Faced: Max. 250°F / 121°C
    Unfaced: Max. 450°F / 232°C
- Water Vapor Sorption: ASTM C1104 / < 5% by weight
- Water Vapor Transmission – Facing:
  – ASTM E96, Desiccant Method
    FSK and white PSK: Max. 0.02 perms (1.15×10^{-9} g/Pa•s•m²)
    Gray PSK: Max. 0.09 perms (5.17×10^{-9} g/Pa•s•m²)
- Corrosiveness: ASTM C665
  – Pass test requirements
- Fungi Resistance: ASTM C1338
  – Pass test requirements
- Odor Emission: ASTM C1304
  – Pass test requirements

Quality Assurance

CertainTeed's commitment to quality and environmental management has ensured the registration of the Athens, Chowchilla and Kansas City plants to ISO 9001:2000 and ISO 14001:2004 standards. The GREENGUARD® Environmental Institute has certified SoftTouch Duct Wrap Insulation for low emissions of formaldehyde and other Volatile Organic Compounds (VOCs).

www.certainteed.com/insulation

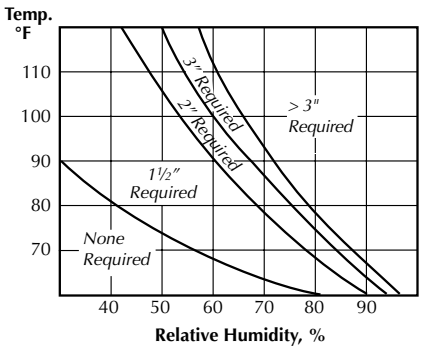
TECHNICAL SERVICES

Technical assistance can be obtained either from your local CertainTeed sales representative, or by calling CertainTeed Sales Support Group in Valley Forge, PA at 800-233-8990.

FILING SYSTEMS

- CertainTeed Pub. No. 30-36-081
- Sweet's Catalog Files, 230700
- Additional product information available upon request.

CONDENSATION CONTROL



This chart is based on indoor conditions so far as wind and other factors are concerned.

To determine thickness to prevent condensation, based on installed thickness at 75% of nominal (out-of-package) thickness and a duct internal air temperature of 55°F, refer to the condensation control chart.

To use: 1) Select maximum relative humidity (%) on lower axis; 2) Read up vertically until that line intersects the maximum ambient air temperature; 3) Select the thickness indicated at the point of intersection.

THERMAL PERFORMANCE

Product Type	Thickness in.	Thickness mm	R-Value h•ft²•°F/Btu	R-Value m²•°C/W	Installed R-Value h•ft²•°F/Btu	Installed R-Value m²•°C/W	K-Value Btu•in/h•ft²•°F	K-Value W/m²•°C	Installed K-Value Btu•in/h•ft²•°F	Installed K-Value W/m²•°C
75 (0.75 pcf*)	1	25	3.8	0.67	3.0	0.53	0.26	0.038	0.25	0.036
	1½	38	5.2	0.92	4.2	0.74	0.29	0.042	0.27	0.039
	2	51	6.9	1.22	5.7	1.00	0.29	0.042	0.26	0.038
	2⅛	54	7.3	1.29	6.0	1.06	0.29	0.042	0.27	0.038
	2½	64	8.6	1.51	7.1	1.25	0.29	0.042	0.26	0.037
	3	76	10.2	1.80	8.3	1.46	0.29	0.42	0.27	0.039
	4	102	13.5	2.38	11.0	1.94	0.30	0.043	0.27	0.039
100 (1.0 pcf*)	1	25	3.8	0.67	3.0	0.53	0.26	0.038	0.25	0.036
	1½	38	5.7	1.00	4.5	0.79	0.26	0.038	0.25	0.036
	2	51	7.6	1.34	6.1	1.07	0.26	0.038	0.25	0.035
150 (1.5 pcf*)	1	25	4.1	0.72	3.2	0.56	0.24	0.035	0.23	0.034
	1½	38	6.2	1.09	4.8	0.85	0.24	0.035	0.23	0.034
	2	51	8.3	1.46	6.4	1.13	0.24	0.035	0.23	0.034

Tested in accordance with ASTM C518 and/or ASTM C177 at 75°F (24°C) mean temperature. R means resistance to heat flow. The higher the R-value, the greater the insulating power. The installed R-value and K-value based upon 25% compression of the product thickness during installation. To get the installed R-value, it is essential that this insulation be installed properly. If you do it yourself, follow the installation instructions carefully.

*pcf. is pounds per square foot

INSTALLATION STRETCH-OUT DIMENSIONS

Product Label Thickness in.	Product Label Thickness mm	Average Installed Thickness in.	Average Installed Thickness mm	Stretch-Out Dimensions[1] perim.	Round Duct in.	Round Duct mm	Square Duct in.	Square Duct mm	Rectangular Duct in.	Rectangular Duct mm
1	25	0.75	19	P+	7.0	178	6.0	152	5.0	127
1.5	38	1.13	29	P+	9.5	241	8	203	7	178
2	51	1.50	38	P+	12	305	10	254	8	203
2.125	54	1.59	40	P+	12.6	321	10.4	270	8.4	213
2.5	64	1.875	48	P+	14.5	368	12.5	318	9.5	241
3	76	2.25	57	P+	17	432	14.5	368	11.5	292
4	106	3.00	76	P+	22.0	559	18.5	470	14.5	368

[1] The stretch-out dimension is equal to the duct perimeter (P) plus the add-on factor for the type of duct being installed.

AVAILABLE SIZES

Product Type	Facing	Thickness in.	Thickness mm	Length in.	Length m	Width in.	Width mm
75 (0.75 pcf)	UNFACED	1	25	150	45.7	9 - 72	229 - 1829
		1½	38	150	45.7		
		2	51	75	22.9		
		2½	64	75	22.9		
		3	76	50	15.2		
	FSK/PSK	1½	38	100	30.5	48	1219
		2	51	75	22.9		
		2⅛	54	75	22.9		
		2½	64	75	22.9		
		3	76	50	15.2		
		4	102	50	15.2		
100 (1.0 pcf)	Unfaced	1	25	150	45.7	9 - 72	229 - 1829
	FSK/PSK	1	25	100	30.5	48	1219
		1½	38	100	30.5		
		2	38	75	22.9		
150 (1.5 pcf)	FSK/PSK	1½	38	75	22.9	48	1219
		2	51	50	15.2		

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Professional: 800-233-8990
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